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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/758,132	01/16/2004	Erik S. Jeng	P69439US0	5024

7590 03/09/2006

JACOBSON, PRICE, HOLMAN & STERN
PROFESSIONAL LIMITED LIABILITY COMPANY
400 Seventh Street, N.W.
Washington, DC 20004

EXAMINER

BOOTH, RICHARD A

ART UNIT	PAPER NUMBER
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2812

DATE MAILED: 03/09/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/758,132

Applicant(s)

JENG ET AL.

Examiner

Richard A. Booth

Art Unit

2812

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 February 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 11-16 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 11-16 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 2/22/06 has been entered.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 11-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Halliyal et al., U.S. Patent 6,319,775 in view of Walker et al., U.S. Patent 5,371,027.

Halliyal et al. shows the invention as claimed including a kind of non-volatile memory structure comprising: a base 16; a gate dielectric layer 28,30,32 on the base; a gate electrode 34 on the top of the gate dielectric layer; and source/drain electrodes at the base of both sides of the gate dielectric layer and connected with the source/drain regions (12,14) (see fig. 1 and col. 4-line 14 to col. 6-line 43).

Halliyal et al. is applied as above but does not expressly disclose the gate dielectric layer having at least one kind of hetero element, other than nitrogen, to increase the electron trapping density.

Walker et al. discloses introducing silicon into the gate dielectric tunneling layer in order to improve the tunneling characteristics (see abstract). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate silicon into the gate dielectric layer of Halliyal et al. because such a process improves the performance of the memory device.

Claims 11-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chen, US 2003/0232507 in view of Walker et al., U.S. Patent 5,371,027.

Chen shows the invention as claimed including a kind of non-volatile memory structure comprising: a base; a gate dielectric layer 16,17,18 on the base; a gate electrode 72 on the top of the gate dielectric layer; and source/drain electrodes at the base of both sides of the gate dielectric layer and connected with the source/drain regions (although not shown note that source/drain regions are inherent parts of the non-volatile memory device shown in Chen) (see paragraphs 0023-0031).

Chen is applied as above but does not expressly disclose the gate dielectric layer having at least one kind of hetero element, other than nitrogen, to increase the electron trapping density.

Walker et al. discloses introducing silicon into the gate dielectric tunneling layer in order to improve the tunneling characteristics (see abstract). In view of this

disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate silicon into the gate dielectric layer of Chen because such a process improves the performance of the memory device.

Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Halliyal et al., U.S. Patent 6,319,775 in view of Walker et al., U.S. Patent 5,371,027 as applied to claims 11-14 above, and further in view of Naguib et al., U.S. Patent 4,683,645.

Halliyal et al. and Walker et al. are applied as above but do not expressly disclose the use of germanium as a hetero element.

However, Walker et al. discloses that heavy ions can be used and Naguib et al. discloses the use of germanium as a heavy ion (see abstract). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the process of Halliyal et al. modified by Walker so as to include germanium as the heavy element rather than silicon because Naguib et al. recognizes the use of germanium as a heavy ion.

Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Halliyal et al., U.S. Patent 6,319,775 in view of Walker et al., U.S. Patent 5,371,027 as applied to claims 11-14 above, and further in view of Bryant et al., U.S. Patent 2005/0245009.

Halliyal et al. and Walker et al. are applied as above but do not expressly disclose the use of oxygen as a hetero element.

However, Walker et al. discloses that heavy ions can be used and Bryant et al. discloses the use of oxygen as a heavy ion (see paragraph 0032). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the process of Halliyal et al. modified by Walker so as to include oxygen as the heavy element rather than silicon because Bryant et al. recognizes the use of germanium as a heavy ion.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Richard A. Booth whose telephone number is (571) 272-1668. The examiner can normally be reached on Monday-Thursday from 7:30-6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Lebentritt can be reached on (571) 272-1873. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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A handwritten signature in black ink, appearing to read 'R. Booth', with a stylized, flowing script.

Richard A. Booth
Primary Examiner
Art Unit 2812

March 1, 2006